

## CYCLO TORQUE MULTIPLIERS

**Abstract:** Geometric design arrangements and relations of cyclo gears fashioned to produce high mechanical rigidity, long life expectancy, and applicability. These designs incorporate bearing and hub-axis, hollow centers and hollow torque pins, especially with three disks and three cam cyclo gear arrangements. The previous performance limiting load vector influence is eliminated. These inventions simplify the building of machines, particularly when multiple cyclo gear axes are used in sequence, as in base turn tables and arm and wrist assembly clusters for robots and other tools. A true roll-up by maximum engagement of the cyclo components is guaranteed by employing the geometrical relations shown. Also included are 1) a schematic showing simplification of the absolute encoder system for servos in machine tools and robotics and 2) a circuit for an anti-oscillating add-on filter for servos in machine tools and robotics. Time spacing update limitations of many controls and the form plasticities of materials are being minimized and masked with these patent features.